Alternator Plug types: (COM / DF(M) / C / RLO / PCM)

COM Plug connector:

Modern type alternators have a COM connection / plug.

What is COM:

COM stands for Communication or Computer and is a digital communication signal, referred to in bytes.

Functions:

- These connections are developed to save fuel.
- These connections use a digital signal, one faster than the other.
- The faster the alternator reacts to the car computers commands, the faster fuel will be saved.
- The communication speed is called Baud Rate.

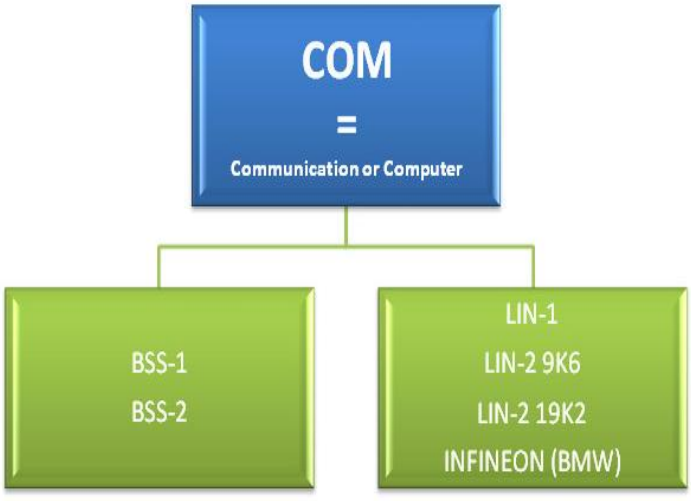
Baud-Rate:

Transfer rate of a serial connection, the amount of bits per second over a serial channel can be sent. A measurement of the speed at which a modem transmits data. Often confused with bps (the number of bits per second that is sent), the baud-rate measurement is in fact the number of events, or signal changes, that occur in one second. An event in digital communication with the high speed in fact can encode more than one bit, and baud rate is not necessarily synonymous bps, the last one is a more accurate unit which is applicable to modems. A 9600-baud modem for example, that 4 bits per event encodes actually works with 2400 baud, but transmits at 9600 bps (2400 event times 4 bits per event) and would be named a 9600 bps modem.

Protocols:

There are numerous kinds of protocols.

Below you will find an overview of the most common protocols and on which applications they are used on:



BSS-1	Mercedes / Audi / BMW / VW / MINI / Rolls Royce / Renault
LIN-1	Ford / Volvo
LIN-2 9K6:	Ford / Volvo
LIN-2 19K2	Mercedes / Chrysler / Toyota / Fiat / Audi / VW / Porsche / Citroen / Peugeot
NEW: Infineon VDA	Until now only used on BMW (2012)

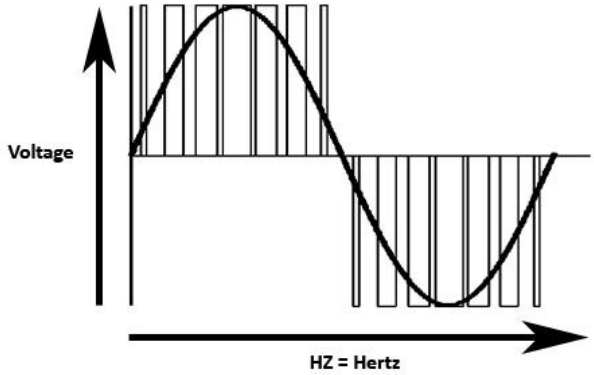
DFM Plug connector:

DF(M) stands for **Digital Field Monitor**.

Every alternator brand has a different abbreviation for the DF(M) connection, for example: FR(Field Return), DF(Digital Field) , DFM(See above), M(Monitor), LI(Load Indicator).

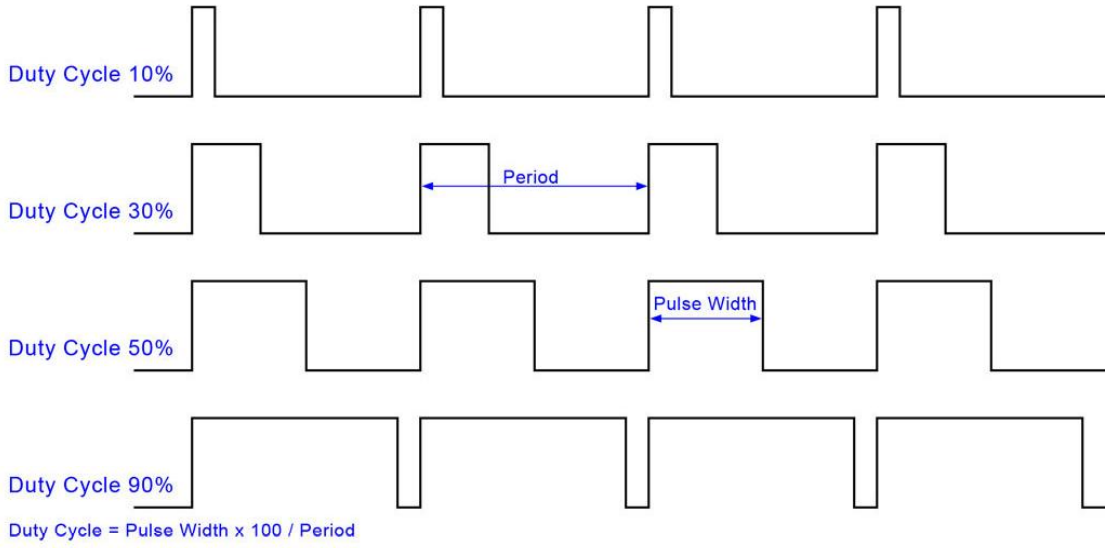
They all function in the same way.

Function:
About the DFM connection there is a positive and negative measurement and both work with a block pulse.
When the alternator load increases the block pulse depending on the car application becomes wider or smaller. This is measured in % also called PWM (Pulse Width Modulation).
The car ECU then knows what the load is at a specific moment during charging. If the load is to high the car ECU can shut down some car accessories and or increase the idle speed.



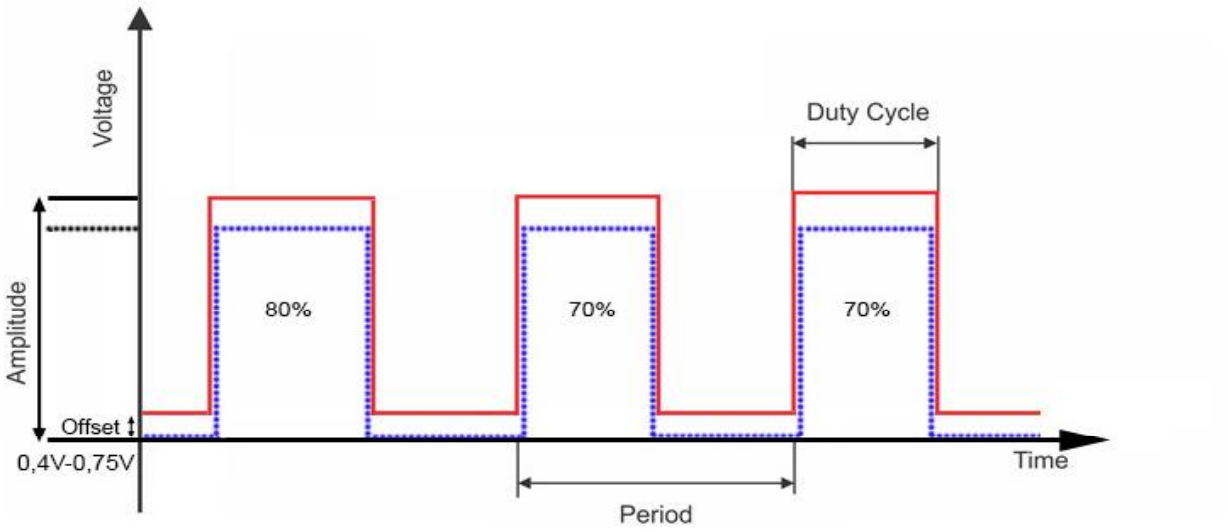
DFM (M, FR, DF, LI, F) is a block signal (information) that is sent from the alternator to the car ECU.
It shows the load level of the rotor of the alternator, also known as electromagnetic force.
This has a direct influence on the produced energy of the alternator.
The voltage is regulated by turning on the rotor current with a frequency of eg.150HZ, which changes the electromagnetic force.
The longer the duration time of the current, the wider the duty cycle will be.

Below you see a diagram as an example to show you what the signal looks like when connected to an oscilloscope:



When looking at the structure of the transistor, an off-set of the DFM signal could show up and will vary in voltage somewhere between 0,1V-1,2V.

The actual diagram on the oscilloscope will look like the drawing below:



If the off-set were to exceed 0,75V, the ECU probably won't recognize the signal and because of that could calculate the wrong load of the alternator at that specific time.
The tester will show three results of the signal:
1. The frequency eg.150HZ
2. The width depending on the alternator load at that specific moment from 0-99 %.
3. Offset - from 0,1 t/m 1,2Volts
The best testing method is to compare the DFM signal to another alternator with the same OE number.
To check this, place an alternator with a DFM connection on the test bench and connect the DFM connection to the VC-17F and change the RPM's to 1500, 2500 and 3500 RPM.
During the test put three different increasing loads on the alternator and write them down.
Now replace the OE alternator with a rebuild or aftermarket version and repeat the test above.
Compare the values and if the results are the same, the alternator will function well on the car.
If the results are different (especially the width in percentages), the best thing to do is to replace the regulator.
If the width changes like the OE version, the alternator is tested ok and if it doesn't the alternator is faulty. This test is 100% reliable!